

sub B5 amended.
A13 cond. fusible elements on the ball grid array to center on pads on the substrate upon mounting to the substrate.

REMARKS

Entry of this response and reconsideration and allowance of the above-identified patent application are respectfully requested. Claims 1-20 and 25-32 were rejected in the Office Action. Claims 21-24 are subject to a restriction requirement under 37 CFR 1.142 (b). Following a telephone conversation with the Examiner, claims 1-20 and 25-32 were elected for further prosecution. Claims 21-24 have been canceled from the present application; however, Applicants reserve the right to pursue the patentability of claims 21-24 in a later-filed divisional patent application that claims priority to the present application.

Claims 33-41 have been added. Upon entry of this amendment and response, claims 1-20 and 25-41 will be pending in the application. No new matter has been added, and no additional prior art searches are required by the amendments.

The specification was objected to for certain informalities. Applicants have amended the specification to overcome the informalities. Accordingly, these changes are for clarification purposes, and are unrelated to patentability.

Figure 1 has been voluntarily corrected to piece number originally identified as “320” to be --328--. Accordingly, these changes are for clarification purposes, and are unrelated to patentability.

Claim 4, 13, and 17 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. In addition, claims 1-20, 25-27, 31 and 32 stand rejected under 35 U.S.C. § 102 (e) as being anticipated by Szu (U.S. Patent No. 6,196,871) (“Szu”). Also, claims 1-7, 15-20 and 25-28 rejected under 35 U.S.C. § 102 (e) as being anticipated by Huang et al. (U.S. Patent No. 6,152,756) (“Huang”). Finally, claims 29 and 30 stand rejected under 35 U.S.C. 103 (a) as being unpatentable over Huang.

Rejection Under 35 U.S.C. § 112

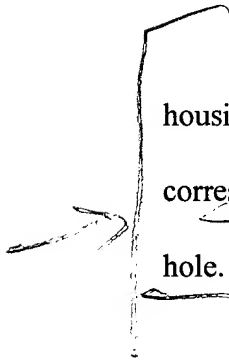
Claim 4, 13, and 17 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. In particular, the Office action notes that claims 4, 13, and 17 are indefinite because “it is not clear the connector is parallel to what.” Applicants have amended claims 4, 13, and 17 to clarify that the referenced terms are parallel to the substrate. Accordingly, Applicants submit that the rejections of claims 4, 13, and 17 under 35 U.S.C. 112

should be removed. Also, please note that these changes are for clarification purposes, and are unrelated to patentability.

Rejection Under 35 U.S.C. § 102 (e)

Claims 1-20, 25-27, 31 and 32 stand rejected under 35 U.S.C. § 102 (e) as being anticipated by Szu. Also, claims 1-7, 15-20 and 25-28 rejected under 35 U.S.C. § 102 (e) as being anticipated by Huang. More specifically, the Office Action contends, *inter alia*, that the adjusting post 18 in Szu acts as a hold down, similar to the hold down discussed in the present application. Similarly, the Office Action alleges, *inter alia*, that the standoff 16 in Huang acts as a hold down, similar to the hold down discussed in the present application.

Amended claim 1 contemplates an electrical connector that is mountable to a substrate. The electrical connector includes a housing, and a surface mount contact that mounts to a pad on the substrate. The electrical connector further includes a non-surface mount hold down that is secured to the housing. The hold down is mountable to a hole in the substrate such that the surface mount contact is able to center itself on the pad when mounted to the substrate.



For example, in just one embodiment, the hold down may be a post that extends from a housing that includes ball grid array solder balls. The hold down may be sized smaller than a corresponding hole in the substrate, for example, such that the hold down may move within the hole. Following this one particular example, during a reflow process, the mobility of the hold

down within the hole permits the solder balls to maintain their self-centering characteristics with respect to the substrate's pads. Once the solder balls are mounted to their respective pads, the hold down thereafter may be fixedly attached to the hole, for example, using the same reflow process. Therefore, in addition to providing strain relief, the hold down permits the solder balls to center themselves with their respective pads on the substrate.

Unlike the present invention, however, neither Szu nor Huang describe a hold down that provides strain relief, and still promotes the self-centering capabilities of the solder balls. On the contrary, although both Szu and Huang describe a standoff-type characteristic, neither disclose a standoff that permits the solder ball to self-center itself.

First, Szu describes an adjusting post 18 that is "*firmly received* in the corresponding half-through holes 361 of the circuit board." (Szu – Column 3, lines 53-57) (emphasis added). Nowhere does Szu suggest providing a standoff with the mobility of the present invention, necessary to facilitate the desired self-centering feature. On the contrary, Szu teaches away from such mobility by describing a post that is firmly received in the hole of the substrate. This is to be expected, because Szu itself admits that its "main object . . . is to provide a method for adjusting differential thermal expansion between an electrical socket and a circuit board." (Szu – column 1, lines 64-66). Szu does not disclose a standoff that facilitates the self-centering features of the solder balls by providing for mobility within the substrate's hole.

Second, Huang describes “standoffs 16 that *rest on an upper surface of the circuit board* after the solder balls 4 are soldered thereto.” (*Huang* – column 3, lines 17-18) (emphasis added).

This is to be distinguished from the present invention, whose hold down mounts to a hole in the substrate. Nowhere does Huang suggest permitting the standoff to penetrate the surface of the substrate, either partially or wholly. It follows, therefore, that Huang does not teach a standoff that facilitates the self-centering characteristics of the solder balls.

Accordingly, applicant respectfully requests that the rejections under 35 U.S.C. § 102(e) over Szu and Huang be removed.

Rejection Under 35 U.S.C. § 103

Claims 29 and 30 stand rejected under 35 U.S.C. § 103 as being unpatentable over Huang. In particular, the Office Action contends that while Huang does not disclose that “the distance allows up to approximately 30 or 40 percent flattening,” such a limitation “would have been obvious to one of ordinary skill in the art . . . to avoid short circuiting between the solder balls.”

For the same reasons expressed above with respect to claims 1-7, 15-20 and 25-28 above for 35 U.S.C. § 102 (e) over Huang, Applicants respectfully request withdraw of the rejection of claims 29 and 30 under 35 U.S.C. § 103.

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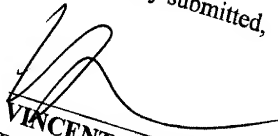
CONCLUSION

In view of the foregoing, Applicant respectfully submits that the present application is in condition for allowance. Reconsideration of the application and an early Notice of Allowance are respectfully requested. In the event that the Examiner cannot allow the present application for any reason, the Examiner is encouraged to contact the undersigned attorney, Vincent J. Roccia at (215) 564-8946, to discuss resolution of any remaining issues.

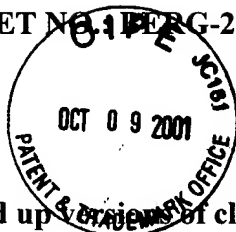
Date: October 5, 2001

WOODCOCK WASHBURN KURTZ
MACKIEWICZ & NORRIS LLP
One Liberty Place - 46th Floor
Philadelphia, PA 19103
Telephone: (215) 568-3100
Facsimile: (215) 568-3439

Respectfully submitted,


VINCENT J. ROCCIA
Registration No.: 43,887

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Marked up versions of claims 1, 4, 6, 8, 9, 10, 13, 15, 17, 25, 31, which are amended herein, showing all of the changes relative to the previous version of each.

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1. An electrical connector, mountable to a substrate and comprising:
 - a housing;
 - a surface mount contact secured to said housing and adapted to surface mount to a pad on the substrate; and
 - a non-surface mount hold down secured to said housing and adapted to mount to a hole in the substrate so as to permit said surface mount contact to center on said pad upon mounting to the substrate.
4. The electrical connector as recited in claim 1, wherein said electrical connector is constructed such that it remains substantially parallel to the substrate when mounted thereon[to the substrate].
6. The electrical connector as recited in claim 1, [further comprising a standoff secured to said housing,]wherein said [standoff] non-surface mount hold down is adapted to retain said housing a distance from a surface of the substrate[or to limit flattening of a solder joint between said surface mount contact and the substrate].
8. The electrical connector as recited in claim 1, wherein said non-surface mount hold down is a post extending outwardly from said housing[and is adapted to enter a hole in the substrate].
9. A ball grid array connector mountable to a substrate, comprising:

a housing;
a plurality of contacts within said housing;
a plurality of fusible elements secured to said contacts for mounting [said connector] to pads on [to] the substrate; and
a hold down adapted to enter ^{a hole in} the substrate so as to permit said fusible elements to center on the pads upon mounting to the substrate, wherein said hold down is secured to said housing.

10. The ball grid array connector as recited in claim 9, [further comprising a standoff extending from said housing and] wherein said hold down is adapted to retain said housing a distance from a surface of the substrate [or to limit flattening of said fusible elements during reflow].

13. The ball grid array connector as recited in claim 9, wherein said ball grid array connector is constructed such that it remains substantially parallel to the substrate when mounted thereon [to the substrate].

15. A method of mounting an electrical connector to a substrate, comprising:

providing an electrical connector having a contact and a hold down;
providing a substrate having pads;
securing said contact to said pads on said substrate;
placing said hold down into said substrate so as to permit said contacts to center on the pads upon mounting to the substrate; and
securing said hold down to said substrate.

17. The method as recited in claim 15, further comprising constructing said electrical connector such that it remains substantially parallel to the substrate when mounted thereon [to the substrate].

25. An electrical connector mountable to a substrate, comprising:

a housing having a mounting end facing the substrate;

a plurality of contacts secured to said housing;

a plurality of fusible elements, each secured to a respective one of said

plurality of contacts; and

a standoff extending a distance from said mounting end of said housing, and wherein said standoff enters the substrate so as to permit said fusible elements to center on pads upon mounting to the substrate[;].

[wherein said distance is selected to limit flattening of said fusible elements during reflow].

31. In a ball grid array connector mountable to a substrate, wherein the improvement comprises a hold-down adapted to enter an opening in the substrate, so as to permit fusible elements on the ball grid array to center on pads on the substrate upon mounting to the substrate.

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Marked up versions the first paragraph on page 1 of the specification, under "Cross-Reference to Related Applications," which is amended herein, showing all of the changes relative to the previous version.

This application claims priority under 35 U.S.C. § 119(e) to U.S. Provisional Patent Applications Serial No. 60/160,482, which was filed on October 19, 1999. In addition, the subject matter disclosed herein is related to the subject matter disclosed in copending Application Ser. No. 09/692,529 (Attorney Docket Number [C2648/Berg-2547] Berg-2547/C2648), filed on October 19, 2000. Both applications are herein incorporated by reference.

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Marked up versions of the paragraph beginning on line 19 and ending on line 20 of page 5, which is amended herein, showing all of the changes relative to the previous version.

Figures 8A-[8B] 8C show a portion of a substrate so as to illustrate the self-centering characteristics of the inventive connector.

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Marked up versions of the first full paragraph beginning on line 6 and ending on line 11 of page 7, which is amended herein, showing all of the changes relative to the previous version.

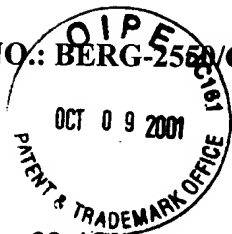
In a manner similar to that described in International Publication number WO 98/15991, pockets on the bottom surface of wafer 311 can receive solder paste (not shown) provided during a squeegee operation. Thereafter, the pockets now filled with solder paste can receive, and temporarily retain, a fusible element 321. A reflow operation then fuses solder balls 321 to contacts 305, 307. Any other manner of securing fusible elements [319] 321 to contacts 305, 307 could be used, however.

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Claims 33-41 have been added to the present application.

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